

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 51

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TURGUT SAHIN, SALVADOR UMOTOY,
AVI TEPMAN and RONALD L. ROSE

Appeal No. 1999-1047
Application No. 08/238,598

ON BRIEF

Before McCANDLISH, Senior Administrative Patent Judge, and ABRAMS and McQUADE, Administrative Patent Judges.

ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 21-24, 27, 30 and 31.¹

We AFFIRM-IN-PART.

¹In an amendment after the final rejection (Paper No. 40), the appellants attempted to cancel the remaining claims and recast the claims on appeal in independent form. However, the examiner refused entry of the amendment on the grounds that other matters set forth therein raised new issues (Paper No. 41).

BACKGROUND

The appellants' invention relates to a temperature controlled gas distribution plate apparatus. An understanding of the invention can be derived from a reading of exemplary claim 3, which appears in the appendix to the Supplemental Appeal Brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Kessler <u>et al.</u> (Kessler)	4,630,669	Dec. 23, 1986
Bartholomew <u>et al.</u> (Bartholomew '020)	4,834,020	May 30, 1989
Awaya <u>et al.</u> (Awaya)	5,019,531	May 28, 1991
Bartholomew <u>et al.</u> (Bartholomew '975)	5,136,975	Aug. 11, 1992
Tappan <u>et al.</u> (Tappan)	5,200,232	Apr. 6, 1993

Drawing figures illustrating the prior art as explained on page 5 of the specification (the conceded prior art).

Claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 23, 24, 27, 30 and 31 stand rejected under 35 U.S.C. § 103 as being unpatentable over Awaya in view of Bartholomew '020 and Kessler.²

Claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 21-24, 27, 30 and 31 stand rejected under 35 U.S.C. § 103 as being unpatentable over the conceded prior art in view of Bartholomew '020, Bartholomew '975, Awaya and Tappan.

²A rejection of these claims under 35 U.S.C. § 103 on the basis of Awaya alone was withdrawn by the examiner in the Supplemental Answer (Paper No. 47).

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the Answer (Paper No. 44) and the Supplemental Answer (Paper No. 47) for the examiner's complete reasoning in support of the rejections, and to the Supplemental Brief (Paper No. 46) and Reply Brief (Paper No. 47½) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The appellants' invention is directed to improving the operation of the gas distribution plates utilized in semiconductor wafer processing equipment. It provides a cooling system for the gas distribution plate which prevents the tungsten hexafluoride gas and the silane gas being passed therethrough from forming a layer of tungsten silicide on the inner surface of the plate, which would then flake off to contaminate the system (specification, pages 1-4). The invention has been disclosed in the context of a retrofit that can be installed on a prior art apparatus, in which the cooling system provided for the process gas inlet manifold is interfaced with the cooling system that is incorporated into the gas distribution plate by the invention.

Both of the standing rejections are under 35 U.S.C. § 103. A prima facie case of obviousness is established when the teachings of the prior art itself would appear to have suggested the claimed subject matter to one of ordinary skill in the art (see In re Bell, 991 F.2d 781, 783, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993)). This is not to say, however, that the claimed invention must expressly be suggested in any one or all of the references, rather, the test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art (see, for example, Cable Elec. Prods. v. Genmark, 770 F.2d 1015, 1025, 226 USPQ 881, 886-87 (Fed. Cir. 1985)), considering that a conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference (see In re Bozek, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969)), with skill being presumed on the part of the artisan, rather than the lack thereof (see In re Sovish, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985)). Insofar as the references themselves are concerned, we are bound to consider the disclosure of each for what it fairly teaches one of ordinary skill in the art, including not only the specific teachings, but also the inferences which one of ordinary skill in the art would reasonably have been expected to draw therefrom (see In re Boe, 355 F.2d 961, 965, 148

USPQ 507, 510 (CCPA 1966) and In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)).

Claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 23, 24, 27, 30 and 31 stand rejected as being unpatentable over Awaya in view of Batholomew '020 and Kessler. The appellants have chosen to group all of these claims together, and we have selected claim 3 as the representative claim (see 37 CFR § 1.192(c)(7) and Section 1206 of the Manual of Patent Examining Procedure). As we understand the rejection, it is the examiner's view that all of the subject matter recited in claim 3 is disclosed or taught by Awaya, except for the manner in which the gas distribution plate is constructed to form the cooling passage. However, the examiner has taken the position that it would have been obvious to one of ordinary skill in the art to modify the Awaya one-piece gas distribution plate having a fluid passage therethrough with a two-piece plate in which a fluid passage formed in the base is closed by a separate cover, in view of the teachings of Kessler. The appellants have offered two arguments in rebuttal. The first is that there would have been no suggestion to one of ordinary skill in the art to modify the Awaya structure in the manner proposed by the examiner, and the second is that even if such a combination were proper, the result would be a passage closed by a cylindrical sleeve rather than a plate, as is required by the claims.

At the outset, we voice our agreement with the examiner that the appellants have utilized the term “plate” in a manner which is so broad as to fairly allow it to include the cylindrical sleeve disclosed by Kessler. This is based in the fact that the entire structure shown in Figure 3 has been labeled “the gas distribution plate” (emphasis added) throughout the specification (see, for example, page 6, lines 1 and 2). This element is not a “plate” in the sense of the applicable common definition of the term (a smooth, flat piece of material),³ but is a complex, three-dimensional structure that includes, as illustrated in Figure 3, horizontal substantially flat walls connected by a vertical cylindrical wall. In view of this use of the term “plate” by the appellants, it is our view that the cylindrical gas ejecting panel 9 of Awaya, and the cylindrical base 34 and cover 44 of Kessler, also can be interpreted as being “plates” in evaluating the issue of the obviousness of the subject matter recited in the appellants’ representative claim 3.

Awaya discloses a deposition apparatus in which gases flow from a holder through a gas distribution plate (gas ejecting chamber 9) on their way to being deposited upon a substrate. Control of the temperature of the gas distribution plate is provided by means of a plurality of annular passages 14 formed in the outer wall thereof, through which fluid flows from a heat exchanger (Figure 10). The manner in which the passages are formed is not disclosed, but it could be surmised from the representation in the drawings that they are

³See, for example, Webster’s New Collegiate Dictionary, 1973, page 880.

cast or molded into the gas distribution plate during its manufacture. Be that as it may, what is clear is that the reference does not teach that each passage comprises a channel formed within a base part which is sealed by a separate cover plate.

As explained in columns 1 and 2, the Kessler invention solved a problem that was present in the art of providing cooling for a gas vapor deposition system for processing wafers. The problem involved cooling the O-ring seals in the end caps of quartz tubes, which previously had been attempted by wrapping cooling fluid tubing about the circumference of the end cap and welding it in place with or without a heat sink paste between the tubing and the end cap, by machining grooves in the end cap and installing the tubing therein, and by sliding a sleeve over the tubing in the grooves to force it into better contact with the end cap. According to Kessler, these techniques resulted in insufficient cooling and were difficult to accomplish. Kessler solved the problem by forming a fluid passage in the outer surface of the end cap and then sealing it with a separate cover plate installed over the fluid passage, with the cover plate being provided with fluid inlet and outlet ports in communication with the passage. It should be noted that the fluid passage is not continuous, so the fluid must flow from the inlet, which is at one end, to the outlet, which is at the other end. The stated advantages of this construction

over the prior art systems are that it is highly efficient, is readily constructed, and is easy to install and use (column 2, lines 17-23). While the purpose of the inventive construction was to cool the O-ring seals 16 in the base part, it is our view that one of ordinary skill in the art would have recognized that this is accomplished by cooling at least a portion of the tube structure.

From our perspective, one of ordinary skill in the art would have found explicit suggestion in Kessler to modify the Awaya gas distribution plate in the manner proposed by the examiner, that is, forming the fluid passage as a groove in the outer surface of the element and then sealing it by installing over it a cover plate which also carries the fluid inlet and outlet. Suggestion for this is found in the explicit advantages recited by Kessler in column 2. The appellants have not challenged the examiner's statement that Bartholomew '020 teaches it was known in the prior art at the time of the appellants' invention that in systems in which tungsten silicide is deposited the reactant gases must be kept cool immediately prior to the deposition. We therefore consider Bartholomew '020 to be evidence of the need to keep the reactive gases used in this type of apparatus cool until that time.

For the reasons set forth above, we conclude that the combined teachings of Awaya, Kessler and Bartholomew '020 establish a prima facie case of obviousness with

regard to the subject matter of claim 3, and we will sustain the rejection of claim 3 and the other claims in the group.

We reach the opposite conclusion, however, with regard to the rejection of claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 21-24 27, 30 and 31 as being unpatentable over the conceded prior art in view of Bartholomew '020, Bartholomew '975, Awaya and Tappan. The appellants have argued that no suggestion exists in Tappan for modifying the Awaya gas distribution plate in the manner proposed by the examiner, and we agree.

It is axiomatic that the mere fact that the prior art structure could be modified does not make such a modification obvious unless the prior art suggests the desirability of doing so. See In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Tappan is directed to a reaction chamber design and method for minimizing particle generation in a plasma-enhanced chemical vapor deposition system. This reference discloses a plasma shield 6 that is provided with an annular cooling system passage the purpose of which is to cool the line-of-sight surface. The cooling system comprises an annular passage formed in the plasma shield member 8 which appears to be sealed by a cover (unnumbered). Unlike Kessler, Tappan sets forth no advantage of this construction over others that might have been known to the artisan. We therefore fail to perceive any teaching, suggestion or incentive in either Awaya or Tappan which would have led one of ordinary skill in the art to modify the Awaya gas distribution plate by replacing the

disclosed fluid passages with the particular construction shown in Tappan rather than other systems, such as those described as the unsuccessful prior art in Kessler, for example. This conclusion is not altered by considering the two Bartholomew patents, which were cited for their teachings of controlling the temperature of elements adjacent to gas output nozzles in deposition apparatus.

From our perspective, the only suggestion for installing the particular temperature control system disclosed by Tappan system in the Awaya apparatus is found in the hindsight afforded one who first viewed the appellant's disclosure. This, of course, is not a proper basis for a Section 103 rejection. In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). Thus, the references applied in this rejection fail to establish a prima facie case of obviousness with regard to claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 21-24, 27 30 and 31, and we will not sustain this rejection.

SUMMARY

The rejection of claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 23, 24, 27, 30 and 31 as being unpatentable over Awaya in view of Bartholomew '020 and Kessler is sustained.

The rejection of claims 3, 4, 6, 7, 10, 13, 14, 18, 19, 21-24, 27, 30 and 31 as being unpatentable over the conceded prior art in view of Bartholomew '020, Bartholomew '975, Awaya and Tappan is not sustained.

A rejection not having been sustained against claims 21 and 22, the decision of the examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

HARRISON E. McCANDLISH)	
Senior Administrative Patent Judge)	
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)	BOARD OF PATENT
NEAL E. ABRAMS)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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Appeal No. 1999-1047
Application No. 08/238,598

Page 12

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APPEAL NO. 1999-1047 - JUDGE ABRAMS
APPLICATION NO. 08/238,598

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APJ McQUADE

APJ McCANDLISH

DECISION: **AFFIRM**

Prepared By:

DRAFT TYPED: 13 Jun 02

FINAL TYPED: